HEALTHY COASTAL ECOSYSTEMS

Healthy coastal ecosystems are the foundation for life along the coast. However, increasingly rapid coastal development, global overfishing, and other human activities are leading to water quality degradation, decline of fisheries, wetlands loss, proliferation of invasive species, and a host of other challenges that need to be understood in order to restore and maintain these ecosystems. Ecosystem functioning does not respect traditional political boundaries, and responsible management of ecosystems requires new kinds of thinking and actions. Sea Grant is a leader in regional approaches to understanding and maintaining healthy ecosystems, with planning efforts underway across the country to identify information gaps, set research priorities, and coordinate information and technology transfer to those who need it. Sea Grant has fostered efforts to address widespread problems such as invasive species that are found in geographically-dispersed areas, and has hired staff, shared among several state programs, to tackle these problems. Sea Grant's regional consortia, nationwide networks, and international contacts are particularly well-suited to helping the nation address ecosystem health at the appropriate local, state, regional, national and global levels.

HEALTHY COASTAL ECOSYSTEMS

Goal

Sound scientific information to support ecosystem-based approaches to managing the coastal environment.

To realize the full potential of ecosystem-based management approaches, we need research that will lead to better understanding of present day conditions, basic ecosystem processes, the impacts of coastal and upland land uses on the health of coastal, ocean and Great Lakes environments, and the importance of healthy ecosystems to healthy fisheries. We also need to know more about how to transform our new knowledge and understandings into sound management principles and practices. Sea Grant will continue to build the scientific foundation needed by supporting research that provides accurate information related to ecosystem health and by accelerating the transfer of this information to coastal residents, resource managers, businesses and industries.

Strategies

- Conduct research on ecosystem processes, the relationships between coastal stressors—water quality degradation, contaminants, harmful algal blooms, invasive species, and wetlands loss—and long-term human and ecosystem health, and communicate this information to public and private planners, decision-makers and managers.
- Contribute to the development of baseline data, standards, and indicators to support ecosystem-based approaches to land use, water, fisheries, and other resource management, working with programs such as NOAA's National Centers for Coastal Ocean Science, ocean observing programs, and others.
- Develop methodologies that can be used to evaluate ecosystem-based management approaches to assess their effectiveness once they are in place, and to guide future management efforts, working with the National Marine Fisheries Service and other federal, state and local partners.

HEALTHY COASTAL ECOSYSTEMS

Goal

Widespread use of ecosystem-based approaches to managing land, water and living resources in coastal areas.

Achieving widespread use of ecosystem-based management approaches will require extensive efforts to communicate the effects of ecosystem degradation on natural resources, local economies, and human health to a wide range of audiences in ways that motivate them to respond. Sea Grant's strong research and extension capabilities provide scientific information and technical assistance on ecosystem-based management approaches. At the same time, the organization's outreach and education capabilities engage citizens in stewardship activities that promote healthy ecosystems. All these programs can result in regional and other collaborative approaches to address problems that extend beyond traditional geographic or governmental boundaries.

Strategies

- Work with partners within and outside of NOAA to develop data, models, and training activities that support ecosystem-based planning and management approaches, and share these with a wide variety of constituencies.
- Support the development of regional coastal observation systems and other collaborative efforts that advance our capability to predict the effects of human activities and environmental changes on coastal resources in order to take steps to mitigate their effects.
- Provide life-long learning programs for people of all ages that enhance understanding of coastal, ocean and Great Lakes environments and promote stewardship of healthy ecosystems.

HEALTHY COASTAL ECOSYSTEMS

Goal

Restored function and productivity of degraded ecosystems.

Past activities and events have led to deterioration of nursery areas for wild fish populations, loss of wetlands, closure of beaches and shellfish beds, and proliferation of invasive species. Sea Grant will help reverse these trends by identifying and assessing impaired ecosystems, and supporting the development of new policies, technologies, and processes that promote restoration of ocean, coastal, and Great Lakes ecosystems in ways that balance the needs of the natural systems with the needs of the humans who inhabit them. Sea Grant will use its nationwide network of extension, education and communication specialists to provide the technical assistance needed, and to share new information and technologies with local, state, regional, national, and international partners.

Strategies

- Support research to improve the effectiveness of ecosystem restoration and identify promising new restoration approaches and technologies.
- Invest in the development and dissemination of new information, policies, technologies and methods to address water quality degradation, prevent the introduction and spread of aquatic non-native species, and minimize the negative impacts of these on coastal, ocean and Great Lakes food webs.
- Provide technical support for citizens and businesses that need help with specific mitigation/ restoration problems, giving them access to the latest information and techniques.

Sea Grant National Implementation Plan 2009-2013

FOCUS AREA: HEALTHY COASTAL ECOSYSTEMS		
GOAL	**STRATEGY**	**SHORT/MID-TERM OUTCOMES**
HCE 1: Sound scientific information to support ecosystem-based approaches to managing the coastal environment	**HCE 1.1:** Conduct research on ecosystem processes, the relationships between coastal stressors—water quality degradation, contaminants, harmful algal blooms, invasive species, and wetlands loss—and long-term human and ecosystem health, and communicate this information to public and private planners, decision-makers and managers. **HCE 1.2:** Contribute to the development of baseline data, standards, and indicators to support ecosystem-based approaches to land use, water, fisheries, and other resource management, working with programs such as NOAA's National Centers for Coastal Ocean Science, ocean observing programs, and others. **HCE 1.3:** Develop methodologies that can be used to evaluate ecosystem-based management approaches to assess their effectiveness once they are in place, and to guide future management efforts, working with the National Marine Fisheries Service and other federal, state and local partners.	**HCE1.a :** Baseline data, standards and indicators developed by Sea Grant and partners are used to support ecosystem-based approaches. **HCE 1.b:** Methodologies are developed and used to evaluate ecosystem-based management approaches and guide future management efforts. **HCE 1.c:** Planners know how to minimize impacts of land use, resource extraction, and other human activities on ecosystems.
HCE 2: Widespread use of ecosystem-based approaches to managing land, water and living resources in coastal areas	**HCE 2.1:** Work with partners within and outside of NOAA to develop data, models, and training activities that support ecosystem-based planning and management approaches, and share these with a wide variety of constituencies. **HCE 2.2:** Support the development of regional coastal observation systems and other collaborative efforts that advance our capability to predict the effects of human activities and environmental changes on coastal resources in order to take steps to mitigate their effects. **HCE 2.3:** Provide life-long learning programs for people of all ages that enhance understanding of coastal, ocean and Great Lakes environments and promote stewardship of healthy ecosystems.	**HCE 2.a:** Constituencies have access to data, models and training that support ecosystem-based planning and management approaches. **HCE 2.b:** Coastal residents, resource managers, businesses, and industries have the capability to predict the effects of human activities and environmental changes on coastal resources. **HCE 2.c:** People of all ages understand coastal, ocean and Great Lakes environments and the need for stewardship of healthy ecosystems.
HCE 3: Restored function and productivity of degraded ecosystems	**HCE 3.1:** Support research to improve the effectiveness of ecosystem restoration and identify promising new restoration approaches and technologies. **HCE 3.2:** Invest in the development and dissemination of new information, policies, technologies and methods to address water quality degradation, prevent the introduction and spread of aquatic non-native species, and minimize the negative impacts of these on coastal, ocean and Great Lakes food webs. **HCE 3.3:** Provide technical support for citizens and businesses that need help with specific mitigation/restoration problems, giving them access to the latest information and techniques.	**HCE 3.a:** Coastal residents, resource managers, businesses, and industries have access to new approaches and technologies developed to improve the effectiveness of restoration coastal ecosystems. **HCE 3.b:** Coastal residents, resource managers, businesses, and industries understand chronic and catastrophic causes and consequences of degraded ecosystems. **HCE 3.c:** Managers draw on both scientific information and the public to prioritize which ecosystems to restore and to set realistic restoration goals.

Long-Term Outcomes:

HCE-L1: Coastal residents, resource managers, businesses, and industries have access to sound scientific information to support ecosystem-based approaches to managing the coastal environment and restoration of degraded ecosystems.
HCE-L2: Coastal residents, resource managers, businesses, and industries use ecosystem based approaches in the management of land, water, and living resources in coastal areas.
HCE-L3: Coastal residents, resource managers, businesses, and industries balance social, natural, physical science in managing resources, and work with all sectors in making decisions.
HCE-L4: Managers have the resources and capacity to undertake restoration projects, do so, and evaluate and adapt as needed.
HCE-L5: Degraded ecosystems' function and productivity are restored.

Performance Measures:

HCE-P1: Number of stakeholders who use ecosystem-based approaches in the management of land, water, and living resources in coastal areas as a result of Sea Grant activities.
HCE-P2: Number of acres of degraded ecosystems restored as a result of Sea Grant activities.
HCE-P3: Number of coastal communities who have restored degraded ecosystems as a result of Sea Grant activities.

FOCUS AREA: SUSTAINABLE COASTAL DEVELOPMENT		
GOAL	**STRATEGY**	**SHORT/MID-TERM OUTCOMES**
SCD1: Healthy coastal economies that include working waterfronts, an abundance of recreation and tourism opportunities, and coastal access for all citizens	**SCD1.1:** Support research and outreach activities that provide local communities with information and techniques to help them enhance their waterfront-related economic activities such as commercial and recreational fishing, aquaculture, tourism, and energy and port development, without diminishing the long-term health of the natural coastal environment. **SCD1.2:** Support local, regional, and national efforts to preserve and increase public access to the nation's beaches and waterfronts through assessment of access needs, analysis of legal issues, and technical assistance. **SCD1.3:** Use Sea Grant extension and education capabilities to engage coastal communities in planning processes that support the efforts of community leaders to identify and pursue sustainable economic development policies and programs.	**SCD1.a:** Local communities have the information and techniques to enhance waterfront-related economic activities and protect the health of the natural coastal environment. **SCD1.b:** Public access to the nation's beaches and waterfronts is preserved or increased. **SCD1.c:** Community leaders are able to identify and pursue sustainable economic development policies and programs. **SCD1.d:** Coastal communities engage in visioning, resource inventories, analysis of development policies and education of community leaders and citizens. **SCD1.e:** Communities are able to analyze the impacts and benefits of alternative development scenarios on coastal resources and economies.
SCD2: Coastal communities that make efficient use of land, energy and water resources and protect the resources needed to sustain coastal ecosystems and quality of life	**SCD2.1:** Strengthen Sea Grant's research activities and extension capacity to help coastal communities determine the sustainable carrying capacity of their land, water, and other resources through resource assessments, scenario building, modeling, and other techniques. **SCD2.2:** Support innovative research on land-use practices and building designs that promote energy and water conservation, coastal-ocean related renewable energy technologies, and the creation of other tools to help communities grow in sustainable ways. **SCD2.3:** Work with NOAA's Climate Program Office, coastal programs, and other partners to help communities evaluate their ecological footprints and grow in environmentally sustainable ways.	**SCD2.a:** Coastal communities determine the sustainable carrying capacity of their land, water, and other resources. **SCD2.b:** Coastal communities use a variety of tools and technologies to adopt policies to protect the sustainable ecosystem footprint needed to sustain coastal, marine, and Great Lakes ecosystems and implement community designs that are compatible with carrying capacity of coastal ecosystem and water resources **SCD2.c:** Communities adopt practices that increase their energy efficiency and decrease use of fossil fuels (i.e. Increase in walkability, increase in public transit, decrease in vehicle miles traveled, energy efficient building codes adopted).
SCD3: Coastal citizens, community leaders, and industries that recognize the complex inter-relationships between social, economic and environmental values in coastal areas and work together to balance multiple uses and optimize environmental sustainability	**SCD3.1:** Work with NOAA's Office of Ocean and Coastal Resource Management and Coastal Services Center, EPA's Offices of Smart Growth, and other federal, state and local partners to disseminate assessment tools, model plans and ordinances, best management practices, alternative development approaches, and other techniques that will enable the citizens of our coastal zones to develop their coastal economies in environmentally-sound ways. **SCD3.2:** Build local capacity to evaluate cost-benefit trade-offs in the coastal zone through a greater emphasis on socio-economic research, impact studies, and other methods of evaluating alternative future scenarios for coastal communities. **SCD3.3:** Foster regional cooperation and partnerships among local government officials, community stakeholders, and regional planning organizations to promote sustainable growth plans and strategies that protect local and regional natural resources that will ensure an abundance of these resources is available to serve future generations.	**SCD3.a:** Coastal communities adopt mitigation measures, best management practices, and improved site designs (low impact development, green building design, natural area planning, wild habitat corridors, bio retention areas, vegetative swales) in local policies and ordinances. **SCD3.b:** Coastal communities are able to evaluate cost-benefit trade-off in the coastal zone. **SCD3.c:** Growth plans, policies and strategies are developed and adopted to protect local and regional natural resources to serve future generations. **SCD3.d:** Coastal communities adopt and employ comprehensive land use planning and community design techniques that protect valuable coastal resources, minimize the impact of the built environment and sustain coastal environments.

Long-Term Outcomes:

SCD-L1: Coastal communities and industries have healthy economies that include working waterfronts, an abundance of recreation and tourism opportunities, and coastal access for all citizens.
SCD-L2: Coastal communities make efficient use of land, energy and water resources and protect the resources needed to sustain coastal ecosystems and quality of life.
SCD-L3: Alternative energy technologies (wave, thermal, current, wind, solar) are evaluated for their environmental and economic impacts and adopted.
SCD-L4: Coastal community designs are implemented that improve energy efficiency and reduce carbon emissions
SCD-L5: Coastal citizens, leaders and industries work together to balance multiple land uses and optimize environmental sustainability.

Performance Measures:

SCD-P1: Number of coastal communities engaged in activities (e.g. visioning, resource inventories, analysis of development policies) or making informed development decisions that address the sustainability of economic and environmental resources as a result of Sea Grant's capacity building, tools, data, technologies, and/or education of community leaders.
SCD-P2: Number of coastal communities who have adopted/implement sustainable - economic and environmental - development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, green infrastructure) as a result of Sea Grant activities.
SCD-P3: Economic benefits derived from sustainable coastal policies and practices as a result of Sea Grant activities.

FOCUS AREA: SAFE & SUSTAINABLE SEAFOOD SUPPLY		
GOAL	**STRATEGY**	**SHORT/MID-TERM OUTCOMES**
SSST1: A sustainable supply of safe seafood to meet public demand	**SSST 1.1:** Use Sea Grant's research, extension, education, and communication capabilities to develop and disseminate essential knowledge about natural and human threats to the long-term viability of wild fish populations, to identify ways to minimize these threats, and to use ecosystem-based fisheries management and other innovative approaches to accomplish this. **SSST 1.2:** Conduct integrated research, education, and outreach activities to support a viable domestic aquaculture industry with acceptable environmental impacts, in ways that are consistent with national objectives, building on the leadership role Sea Grant plays in this area. **SSST 1.3:** Work with NOAA's National Marine Fisheries Program, other federal and state partners, and the seafood industry to enhance the management and productivity of wild fisheries.	**SSST 1.a:** Natural and human threats to the long-term viability of wild fish populations are minimized. **SSST 1.b:** A viable domestic aquaculture industry with acceptable environmental impacts is supported.
SSST2: A healthy domestic seafood industry that harvests, produces, processes, and markets seafood responsibly and efficiently	**SSST 2.1:** Engage harvesters, recreational fisherman, producers and managers in the development of research and management innovations related to the condition, use, and conservation of the natural resources they depend on. **SSST 2.2:** Support research, development, and transfer of new technologies to keep the domestic seafood industry financially competitive and environmentally responsible. **SSST 2.3:** Work with the seafood industry to develop new products and innovative marketing approaches to increase seafood availability and profitability.	**SSST 2.a:** Fishermen are knowledgeable and employ efficient fishing techniques. **SSST 2.b:** The seafood processing industry learns and understands techniques and processes to ensure the production and delivery of safe and healthy seafood. **SSST 2.c:** Seafood availability and profitability increases.
SSST3: Informed consumers who understand the importance of ecosystem health and sustainable harvesting practices to the future of our domestic fisheries, who appreciate the health benefits of seafood consumption, and who understand how to evaluate the safety of the seafood they buy	**SSST 3.1:** Enhance training and technical assistance programs related to the application of standards for safe domestic and imported seafood. **SSST 3.2:** Develop educational programs and materials that enhance the American public's understanding of what is required to maintain sustainable domestic fisheries and to build the public's awareness of differences in the quality, safety, and nutritional benefits of different seafood products so they will be informed advocates and consumers. **SSST 3.3:** Work in close coordination with the National Marine Fisheries Service and other federal partners to develop information portals that give access to factual information on seafood safety.	**SSST 3.a:** Seafood industry workers are more competent in the application of standards for safe seafood. **SSST 3.b:** U.S. Seafood consumers have a better understanding of fisheries management, including sustainable fisheries, and can apply this knowledge when evaluating sustainable seafood choices. **SSST 3.c:** U.S. seafood consumers have an increased knowledge of the nutritional benefits of seafood products, know how to judge seafood safety and quality, and can apply this knowledge to make better choices when they purchase seafood. **SSST 3.d:** Information portals are available on seafood safety, nutrition, and sustainability.

Long-Term Outcomes:

SSST-L1: The domestic seafood industry harvests and produces seafood responsibly and efficiently.
SSST-L2: The seafood supply is sustainable and safe.
SSST-L3: Consumers make choices in seafood purchases that support safe, valuable and sustainable seafood industries.

Performance Measures:

SSST-P1: Economic (market and non-market) and societal benefits (jobs created and retained) derived from the discovery and/or application of new fishery production and management models or techniques that lead to increased sustainability and productivity from the fishery.
SSST-P2: Number of fishermen, resource managers and seafood businesses (harvesters, aquaculturists, processors and recreational fishermen) who adopt and implement responsible harvesting and processing techniques and practices.
SSST-P3: Number of producers, distributors and consumers of seafood who modify their practices using knowledge gained in fishery sustainability, seafood safety and the health benefits of seafood.

FOCUS AREA: HAZARD RESILIENCE IN COASTAL COMMUNITIES		
GOAL	**STRATEGY**	**SHORT/MID-TERM OUTCOMES**
HRCC1: Widespread understanding of the risks associated with living, working, and doing business along the nation's coasts	**HRCC1.1:** Conduct research to assess hazard-related risks and increase the availability and usefulness of hazard-related information and forecasting for citizens, industries, and decision-makers in coastal communities. **HRCC1.2:** Work with marine commercial enterprises to assess the risks associated with doing business in coastal areas in the context of hurricanes and other coastal storms, climate-related changes, and dramatic changes in port and international trade activities. **HRCC1.3:** Work with the NOAA Climate Change Program, NOAA's National Weather Service, and other public and private sector partners to develop comprehensive education/literacy programs on the immediate and long-term effects of climate-related changes, and other hazardous events, on human safety and property along the coast, and how to prepare for and survive them.	**HRCC1.a:** Coastal decision-makers benefit from improved risk communication (i.e. better understanding of emergency forecasting, evacuation plans, rip current and surf zone hazards, etc.) and understand the benefits of coastal hazard risk planning. **HRCC1.b:** Coastal decision-makers are aware of existing and available hazard-related data and resources (i.e. wave gauge, water level/tide gauge, weather station data, etc.).
HRCC2: Community capacity to prepare for and respond to hazardous events	**HRCC2.1:** Help public and private decision-makers create and adopt policies, plans, and ordinances to reduce risks, manage catastrophic events and speed recovery. **HRCC2.2:** Create and disseminate, in partnership with NOAA's National Weather Service and other entities, integrated demographic and coastal hazard information databases that help measure human vulnerability in specific coastal regions, support hazard-related planning activities, and facilitate disaster relief efforts. **HRCC2.3:** Conduct research and communicate information on how the use of natural features and new technologies can help communities prepare for and mitigate the impacts of hazardous events.	**HRCC2.a:** Coastal communities have access to and the ability to utilize data and innovative and adaptive tools and techniques to minimize hazard risks (i.e. Planning and construction BMPs, standards, resiliency index, retrofits, flood-zone maps and freeboard). **HRCC2.b:** Coastal decision-makers have the capacity to apply data and resources to hazard planning and response. **HRCC2.c:** Coastal decision-makers have the knowledge and skills to assess local risk vulnerability and respond with appropriate policies and regulations. **HRCC2.d:** Coastal opinion leaders and decision-makers take proactive measures to ensure that hazards, risks, and vulnerabilities are communicated to property owners and perspective purchasers.
HRCC3: Effective response to coastal catastrophes	**HRCC3.1:** Work with NOAA's National Weather Service and the National Ocean Service, regional ocean observation systems, and other partners to make hazard-related data and data-derived products available and relevant to support decision-making during crisis events. **HRCC3.2:** Contribute to the nation's rapid response capability by developing ways to mobilize Sea Grant's national network of scientific and technical expertise to inform response strategies and activities. **HRCC3.3:** Make Sea Grant's local knowledge and contacts available to work with federal, state, regional, and local agencies, non-governmental organizations, and international partners that have hazardous event responsibilities, to facilitate the speed and quality of response to these crises.	**HRCC3.a:** Coastal communities apply best available hazards and climate change information, tools, and technologies to maximize community resiliency to natural hazards. **HRCC3.b:** Communities are safe from hazards in their homes and places of work and experience minimum disruption to life and economy after a natural hazard event, through the use of risk-wise behavior that considers all hazards.

Long-Term Outcomes:

HRCC-L1: Coastal residents are aware of and understand the physical processes that produce hazards and climate change and the implications of those events for their communities.
HRCC-L2: Coastal communities address social and environmental barriers to improve the community's ability to mitigate and respond to natural hazards.
HRCC-L3: Coastal communities are able to effectively respond to coastal catastrophes.

Performance Measures:

HRCC-P1: Number of coastal communities and citizens provided with information/trained in local hazard resiliency, and hazard mitigation tools, techniques, and best practices.
HRCC-P2: Number of coastal communities and citizens who adopt/implement hazard resiliency practices to prepare for and respond to/minimize coastal hazardous events.